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HANDHELD READER KIT

PART NO.
KIT83-008-01
KIT83-008-01E

SPECIAL GROUND SUPPORT EQUIPMENT MANUAL

Initial Issue: Jul 10/2009

32-49-09

T-1
Revision: 0
Jul 10/2009

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NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy. If this equipment is not installed and used in accordance with the instructions, it may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be found by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio technician for help.

NO MODIFICATIONS: Modifications to this device shall not be made without the written consent of Crane Aerospace & Electronics. Unauthorized modifications may void the authority granted under Federal Communications Commission Rules permitting the operation of this device.

SPECIAL GROUND SUPPORT EQUIPMENT MANUAL
KIT83-008

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Original Issue Date: Jul 10/2009

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DESCRIPTION AND OPERATION

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INTRODUCTION

CAUTION: UNLESS OTHERWISE NOTED, ALL INTEGRATED CIRCUITS ON CIRCUIT CARDS ARE CMOS AND REQUIRE SPECIAL STATIC HANDLING PRECAUTIONS.

NOTE: All voltages are DC unless otherwise stated.

Instructions in this manual give information to operate and test the Ground Support Equipment (GSE). These instructions do not cover all details and variations in equipment. For further specific information or in case a particular problem cannot be solved using these instructions, contact the Product Support representative at:

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Email: info@craneae.com

The use of Warnings, Cautions and Notes in this manual is defined as follows:

WARNING: WARNINGS IDENTIFY MATERIALS, PROCESSES, METHODS, PROCEDURES, OR LIMITS THAT CAN CAUSE INJURY TO PERSONS.

CAUTION: CAUTIONS IDENTIFY METHODS AND PROCEDURES THAT CAN CAUSE DAMAGE TO EQUIPMENT.

NOTE: Notes identify or add important data.

Warnings and Cautions are located directly above the data to which they apply. Notes follow the data to which they apply.

Use of the Illustrated Parts List is explained in an introduction to that section.

Verification: The procedures described in TESTING AND FAULT ISOLATION, DISASSEMBLY, and ASSEMBLY were verified by simulation on the dates given below.

Testing and Fault Isolation	May 22/2009
Disassembly	May 22/2009
Assembly	May 22/2009

Acronyms and abbreviations are listed on the next page.

ACRONYMS AND ABBREVIATIONS

ACRONYM	ASSIGNED MEANING
ASIC	Application Specific Integrated Circuit
BAR	Barometric
C	Celsius
CD	Compact Disc
CP	Corrected Pressure
cm	centimeter
F	Farenheit
Fig.	Figure
ft	feet
g	grams
GUI	Graphical User Interface
HHR	Handheld Reader
in.	inch
lb-in	pound-inch
K	Kelvin
kHz	kilo Hertz
kPa	kilo-Pascals
LE	Limit Error
LED	Light Emitting Diode
mm	millimeter
MCM	Multi-Chip Module
ME	Memory Error
N/A	Not Applicable
N-cm	Newton-centimeter
N-m	Newton-meter
PC	Personal Computer
PDA	Personal Digital Assistant
PST	Pacific Standard Time
psi	pounds per square inch
PSIA	Pounds per Square Inch Absolute
psig	pounds per square inch gauge
RE	Read Error
RF	Radio Frequency
RTC	Real Time Clock
TPS	Tire Pressure Sensor
°C	degrees Celsius
°F	degrees Farenheit

1. Maintenance Task Oriented Support System (MTOSS)

This Component Maintenance Manual uses (Maintenance Task Oriented Support System) MTOSS to organize the maintenance information. It is organized by maintenance tasks and subtasks, graphics and tables. Each task consists of one or more subtasks. Each subtask contains procedural steps and can contain one or more graphics or tables.

Each anchor element begins with a title that describes:

- "TASK" or "Subtask"
- ATA Chapter Number
- ATA Section Number
- ATA Subject Number
- Function Code

Function Codes describe the maintenance actions. The list below has brief descriptions of each of the function codes that can be used in this manual.

MTOSS Function Codes

CODE	DESCRIPTION OF FUNCTION
000	Removal and Disassembly
010	Removal
020	Remove Modular Sections
030	Disassemble Modular Sections
040	Disassemble Subassembly
050	Remove Accessory/Power Plant Component
060	Disassemble Accessory
070	Disassemble Accessory Subassembly
080	Remove Test Equipment
090	Disassemble Support Equipment
100	Cleaning
110	Chemical
120	Abrasive
130	Ultrasonic
140	Mechanical
160	Miscellaneous

CODE	DESCRIPTION OF FUNCTION
170	Foam/Water Wash
180	Testing of Solutions
200	Inspection
210	Check
220	Visual/Dimensional
230	Penetrant
240	Magnetic
250	Eddy Current
260	X-Ray
270	Ultrasonic
280	Special
300	Repair
310	Welding and Brazing
320	Machining
330	Stripping and Plating
340	Plasma and Flame Spraying
350	Miscellaneous Repairs
360	Bonding and Molding/Sealing
370	Heat Treating
380	Surface Treating
390	Machine Riveting and Flaring
400	Installation and Assembly
410	Install
420	Install Modular Sections
430	Assemble Modular Sections
440	Assemble Subassembly
450	Install Items Removed for Access
460	Assemble Accessory
470	Assemble Accessory Subassembly

CODE	DESCRIPTION OF FUNCTION
480	Install Test Equipment
490	Assemble Support Equipment
500	Material Handling
510	Shipping
520	Receiving
530	Packing
540	Unpacking
550	Storage
560	Marshalling/Positioning
570	Engine Ferry/Pod Maintenance
600	Servicing/Preserving/Lubricating
610	Servicing
620	Preserving
630	Depreserving
640	Lubricating
700	Testing/Checking
710	Oil Flow
720	Air Flow
730	Fuel Flow
740	Water Flow
750	Electrical/Return to Service
760	Engine
770	Accessory/BITE
780	Pressure Check
790	Leak Check
800-900	Miscellaneous
810	Fault Isolation
820	Adjusting/Aligning/Calibrating
830	Rigging

CODE	DESCRIPTION OF FUNCTION
840	SB Incorporation
850	PN Change/Reidentification
870	Description and Operation
880	Approved Vendor Process
890	Airline Maintenance Program
910	Special Equipment Maintenance
920	Standard Equipment Maintenance
930	Tool Fabrication
940	Special Tool and Consumables Listing
950	IPL Detailed Parts List
960	IPL Equipment Designator Index
970	IPL Numerical Index
980	IPL Vendor List
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DESCRIPTION AND OPERATION

TASK 32-49-09-870-801

1. Description

The Handheld Reader (HHR) Kit is ground support equipment. The HHR (Figure 1) receives and processes data from a Tire Pressure Sensor (TPS) installed on an aircraft wheel.

The HHR calculates tire pressure from pressure and temperature data that is sensed by the TPS. The HHR also gets TPS identification and calibration coefficients from the TPS.

The HHR is a one-piece handheld device with integrated display and removable battery pack. The kit includes an HHR with accessories, and a battery charger. The battery charger is selected for use with a 120 V ac or 240 V ac voltage source. Kits for use with 240 V ac will have the letter “E” at the end of the part number.

TASK 32-49-09-990-801

Figure 1
Handheld Reader

A. Overview

(1) The HHR receives pressure and temperature data from the TPS, calculates and displays results, and stores data in a file that can be loaded into a personal computer (PC) for a permanent record. The HHR can measure tire data on the flight line or in the tire shop. The HHR can also do TPS return-to-service tests.

(2) Figure 2 shows the basic operation of the HHR, PC and TPS.

(3) A Personal Computer (PC) software CD is included in the HHR kit. The PC eHHR-SW software provides a Graphical User Interface (GUI) between the HHR and PC. The User GUI software transfers data records to the PC, and is used to set up and test the HHR.

NOTE: The PC, USB Flash Drive and TPS shown in Figure 2 are not included in the HHR Kit.

TASK 32-49-09-990-802

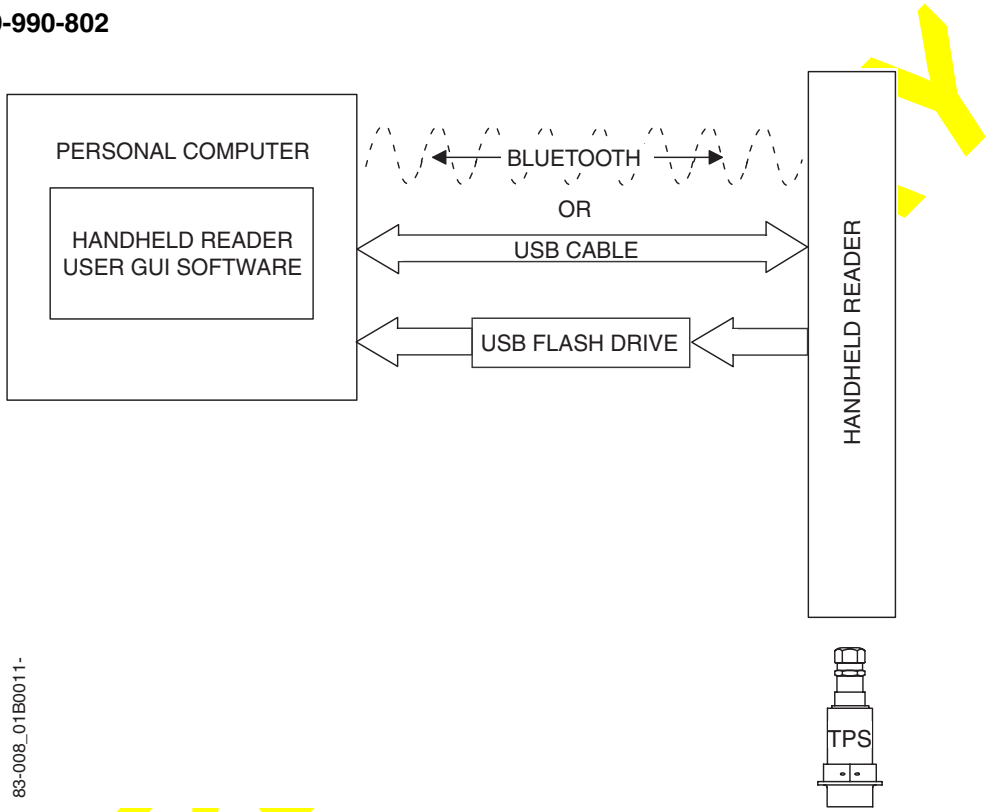


Figure 2
HHR, PC and TPS Basic Operation

B. HHR Components

(1) HHR

(a) The HHR (Figure 3) is used to move data to and from the TPS. Low frequency (134.2 kHz) RF signals are used to transmit commands and supply power to the TPS. Data is also received from the TPS.

(b) Push the READ button to energize the HHR. When the open end of the HHR is near a TPS and the READ button is pushed, an RF signal is sent. The TPS electronics are energized by the RF signal. The HHR then reads the tire pressure, temperature of the tire gases, calibration coefficients, and identification data from the TPS. The data that is received is processed and displayed by the HHR.

(c) The TPS measurements are displayed and stored by the HHR. A file that contains the TPS data records can be copied to a PC.

(d) Communication between the PC and the HHR is managed by the HHR User GUI software application that is installed on the PC.

(e) Table 1 describes the function of the HHR READ, PgUp and PgDn buttons.

TASK 32-49-09-991-801

Table 1
READ Button, PgUp and PgDn Functions

BUTTONS AND LEDS	FUNCTION OR STATUS
	READ Button • Push to start the HHR. • Push to read the TPS. • Push and hold for 2 seconds to exit the setup, test or configuration screens. • Push when in a setup, test or configuration screen to select a value.
	PgUp Button • Push to move up a screen. • Push and hold for 2 seconds to enter the setup and test screens. • Push when in a setup, test and configuration screen to change a value. • Push and hold with the PgDn button, when in a test or setup screen, to enter the configuration screens.
	PgDn Button • Push to move down a screen. • Push and hold for 2 seconds to enter the TPS Data Record screens. • Push when in a test setup and configuration screen to change a value. • Push and hold with the PgUp button, when in a test or setup screen, to enter the configuration screens.

(2) HHR Battery

The HHR is powered by a rechargeable battery pack that inserts into the end of the HHR.

TASK 32-49-09-990-803

Figure 3
HHR Battery

(3) PC eHHR-SW CD

This CD contains HHR User GUI software that communicates between a PC and the HHR. Software installation instructions are given in paragraph 4.

C. Tire Pressure Sensor

NOTE: The Tire Pressure Sensor (TPS) is not a component of the HHR.

The TPS is mounted to an aircraft wheel. The TPS measures tire pressure and temperature, and transmits data through an RF output. There are two types of TPS. One type replaces the wheel valve stem (Figure 4). The other type does not have a valve stem.

When energized by the HHR, the TPS senses tire pressure and temperature. The TPS transmits tire pressure, temperature and identification data to the HHR through an RF signal. The TPS has two or three sensor channels. Each channel is the same as the others, but each operates independently. The HHR compares the data from the TPS and displays the average reading of all channels.

TASK 32-49-09-990-804

Figure 4
TPS on Wheel

D. Personal Computer

NOTE: The PC is not a component of the TPS system or the HHR.

The HHR can connect to a PC through a USB cable. If the PC has Bluetooth capability, the HHR can communicate through a wireless Bluetooth connection. The user can do the tasks given below.

- Copy the Data Records from the HHR to the PC.
- Transfer firmware to the HHR.
- Set up, test, and configure the HHR.

2. HHR Initial Setup

This section describes the setup of the HHR. Procedures are given to operate the HHR and transfer data files between the PC and the HHR. Some HHR settings can only be changed with the HHR User GUI that is installed on the PC. Instructions for installation of the User GUI on the PC are given in paragraph 4.

NOTE: The HHR user displays given in this manual are for reference only. HHR user displays may change in appearance when software and firmware is updated.

A. HHR

If the battery pack is not installed in the HHR, insert a fully charged battery pack as given in ASSEMBLY.

B. HHR Settings

HHR setup and configuration settings can be viewed and set on the HHR. Some settings can only be changed through the HHR User GUI software on the PC. The table below lists the HHR default settings and range.

TASK 32-49-09-991-802

Table 2
HHR Default Settings

HHR SETTINGS	DEFAULTS	RANGE
Real-Time-Clock (RTC)	Factory Set to current Pacific Standard Time	yyyy/MM/dd.HH:mm:ss
Volume	2	0,1,2,3,4
Brightness	1	0,1,2
Corrected Pressure Display • Reference Temperature (1° increments)	Disabled 70° F (21° C)	Enable/Disable -55° to 60° C (-67° to 140° F)
Units • Pressure • Pressure (in tenths) • Temperature	 PSI Disabled F	 PSI/kPa/BAR Enable/Disable F/C
Sleep Mode[1]	Enabled	Enable/Disable
Tip Light[1]	Enabled	Enable/Disable
Tip Light Duration[1]	15 seconds	15 - 120 seconds

1. Can only be changed on a PC with HHR User GUI software.

3. Handheld Reader Operation

A. Charge the Battery

These instructions describe how to use the battery charger to charge the battery (Figure 5).

TASK 32-49-09-990-805

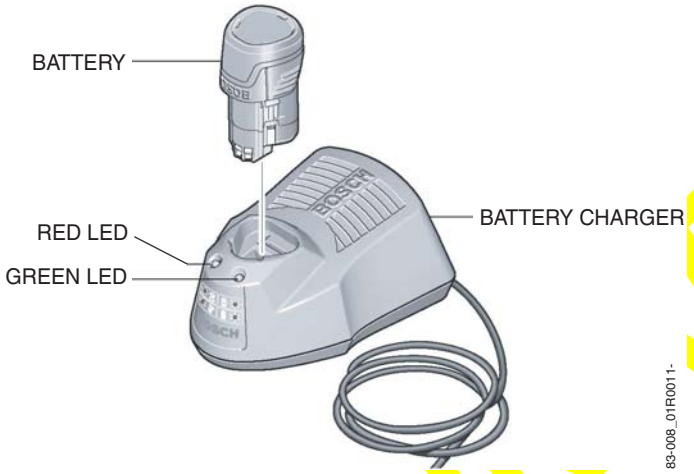


Figure 5
Battery Charger

WARNING: IF THE BATTERY CASE IS CRACKED, DO NOT CHARGE OR USE THE BATTERY. AN EXPOSED BATTERY CAN BURN AND CAUSE A FIRE OR EXPLODE.

WARNING: USE ONLY THE BATTERY CHARGER INCLUDED IN THE HHR KIT. THE HHR USES A LITHIUM-ION BATTERY. FIRE OR EXPLOSION CAN OCCUR IF THE CORRECT CHARGER IS NOT USED.

WARNING: LITHIUM-ION BATTERIES CONTAIN TOXINS. CALL +1-800-822-8837 FOR INFORMATION TO RECYCLE OR DISCARD A LITHIUM-ION BATTERY.

CAUTION: TO AVOID DAMAGE TO THE BATTERY CHARGER, MAKE SURE IT IS CONNECTED TO THE PROPER POWER SOURCE. THERE ARE TWO VERSIONS OF THE BATTERY CHARGER. ONE IS FOR USE WITH 120 V AC AND THE OTHER IS FOR USE WITH 240 V AC.

(1) Connect the battery charger to the wall power outlet.

(2) The green LED will go on, to show that it is ready for operation.

(3) Push the battery into the battery charger.

(4) The green LED will blink while the battery is charged.

(5) If the red LED blinks or is on, see TESTING AND FAULT ISOLATION.

(6) When the battery is charged, the green LED will stay on.

(7) Remove the battery from the battery charger.

(8) Disconnect the battery charger from the wall power outlet.

B. Basic Operation of the HHR

These instructions tell how to energize and operate the HHR.

(1) Start the HHR

Push the **READ** button on the HHR. An initial screen will display the firmware (FW) part number and version (Figure 6). After eight seconds, the date and time are displayed.

TASK 32-49-09-990-806

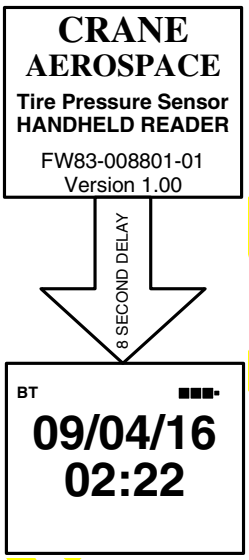


Figure 6
HHR Startup Screens

(2) Read the TPS

(a) Put the HHR over the TPS.

(b) Push the **READ** button on the HHR.

(c) The HHR will display **Reading** (Figure 7).

TASK 32-49-09-990-807

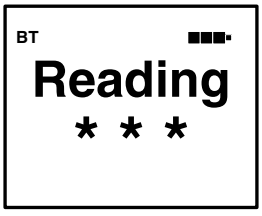


Figure 7
HHR Reading Screen

(d) When the TPS data is received, the HHR will display the results (Figure 8) and beep once.

TASK 32-49-09-990-808

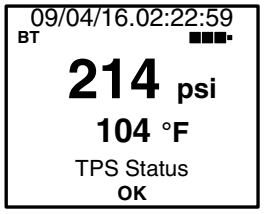


Figure 8
TPS Results Screen

(e) If the Corrected Pressure option is enabled, push the **PgDn** button to show the **Corrected Pressure** screen (Figure 9).

(f) The Corrected Pressure values are given below:

200 psi	Corrected Pressure
@ 70 F	CP Reference Temperature
Ambient 83 F	HHR Ambient Temperature

TASK 32-49-09-990-809

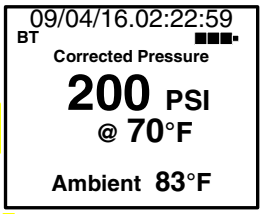


Figure 9
Corrected Pressure Screen

(g) Push the **PgDn** button to display that **Part Data** screen (Figure 10) to show the TPS status.

TASK 32-49-09-990-810

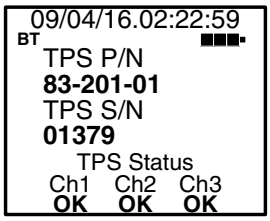


Figure 10
Part Data Screen

(h) If TPS data is not received, the HHR will display **TPS Not Detected** (Figure 11), and will beep three times.

NOTE: If data is not received, move the HHR to different locations around the TPS and repeat this step.

NOTE: Refer to TESTING AND FAULT ISOLATION for a list of error messages.

TASK 32-49-09-990-811

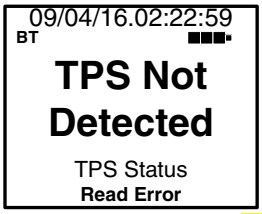


Figure 11
TPS Not Detected Screen

(3) Operate the TPS Tip Light

The Tip Light is a pair of white LEDs found in the tip of the HHR. They give light to help the operator put the tip of the HHR over the TPS in low light conditions. Push the **READ** button quickly twice to set the Tip Light off or on.

NOTE: The tip light duration is set between 15 seconds and 2 minutes, in increments of 15 seconds. Refer to paragraph 3.C.(6) to set the duration.

(4) Power Down the HHR

Push and hold the **READ** button for seven seconds. The HHR will beep twice.

NOTE: If the HHR is not operated for two minutes, the power will go off to extend battery life.

(5) Display the TPS Data Records

(a) Push the **PgDn** button for 2 seconds. The HHR will beep once.

(b) The last Data Record will show on the display. Use the **PgUp** and **PgDn** buttons to see other records.

(c) Push the **READ** button to exit and return to startup screens.

(6) Copy the TPS Data Records to a PC

Three methods are given to load data records from the HHR to a PC:

- USB cable connection
- Wireless Bluetooth connection
- USB Flash Drive transfer.

Data records are created in a Comma Separated Values (CSV) text file format. They can be imported into spreadsheet programs equivalent to Microsoft Excel. The data record file includes a column header to identify the data.

NOTE: The HHR User GUI must be installed for the paragraphs that follow. See paragraph 4.A.

(a) Use a USB Cable to Store Data Record Files

1 Connect a USB cable between the HHR and the PC.

2 Push the **READ** button to start the HHR.

3 On the PC, open the HHR User GUI.

4 Select **Serial Port> Select** from the User GUI menu bar.

NOTE: The User GUI shows list of available serial ports that can connect to the HHR. The serial ports in use will depend on port availability on the PC.

5 Select the COM port that is connected to the USB cable.

NOTE: If a Bluetooth or other wireless device is connected, it may have to be released before the USB cable connection can be established. The User GUI cannot use both ports simultaneously.

6 Select **Data Records > Records** from the User GUI menu bar.

7 Click the **Get Data Records** button.

8 Click the **Save to File** button to store data record files to PC.

9 The **Save As** window will be shown. Select a directory location to store the data records file, then click the **Save** button.

10 HHR file names are formatted to show the HHR serial number with the date and time that the file was saved (Figure 12).

TASK 32-49-09-990-812

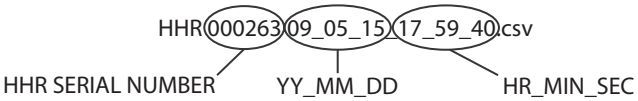


Figure 12
HHR File Name Format

11 Click the **Delete Records** button to erase the data records on the HHR.

12 After data record files have been stored on the PC, select **Serial Port > Select** from the User GUI menu bar.

13 Release the serial port that is connected to the USB cable.

14 Disconnect the USB cable.

(b) Use a Bluetooth Device to Store Data Record Files

1 Start Bluetooth communication on the PC.

2 Push the **READ** button to start the HHR.

3 Refer to the instructions for the Bluetooth device installed on the PC to find and connect to the HHR.

4 When prompted for a device PIN, enter the serial number of the HHR.

NOTE: The serial number is found on the product identification label attached to the bottom of the HHR.

5 Make sure that **BT** on the HHR display changes from green to blue.

6 On the PC, open the HHR User GUI.

7 Select **Serial Port > Select** from the User GUI menu bar.

NOTE: The User GUI shows a list of available serial ports that can be connected to the HHR. The serial ports in use will depend on port availability of the PC.

8 Select the COM port that is connected to the Bluetooth device.

NOTE: If a USB cable is connected, it may have to be released before the Bluetooth connection can be enabled. The User GUI can only be connected to one COM port.

9 Select **Data Records > Records** from the User GUI menu bar.

10 Click the **Get Data Records** button.

11 Click the **Save to File** button to store data record files to PC.

12 The **Save As** window will be shown. Select a directory location to store the data records file, then click the **Save** button.

13 HHR file names are formatted to show the HHR serial number with the date and time that the file was saved (Figure 12).

14 Click the **Delete Records** button to erase the data records on the HHR.

15 Release the serial port that is connected to the PC Bluetooth device.

(c) Use a USB Flash Drive to Store Data Record Files

NOTE: The maximum Flash Drive size is 4GB.

NOTE: The flash drive is not a component of the HHR kit.

1 Push the **READ** button to start the HHR.

2 Insert a USB Flash Drive into HHR USB port.

3 The USB Flash Drive screen will appear on the HHR display.

4 Follow the instructions given on the HHR display screens (Figure 13).

NOTE: If the HHR display shows a **Time Out ERROR**, repeat this step. If the error continues, reformat the Flash Drive on a PC with Windows XP software, or try a different Flash Drive.

NOTE: The Record No XXXX shown in Figure 13 is continuously updated as the data records are being transferred.

TASK 32-49-09-990-813

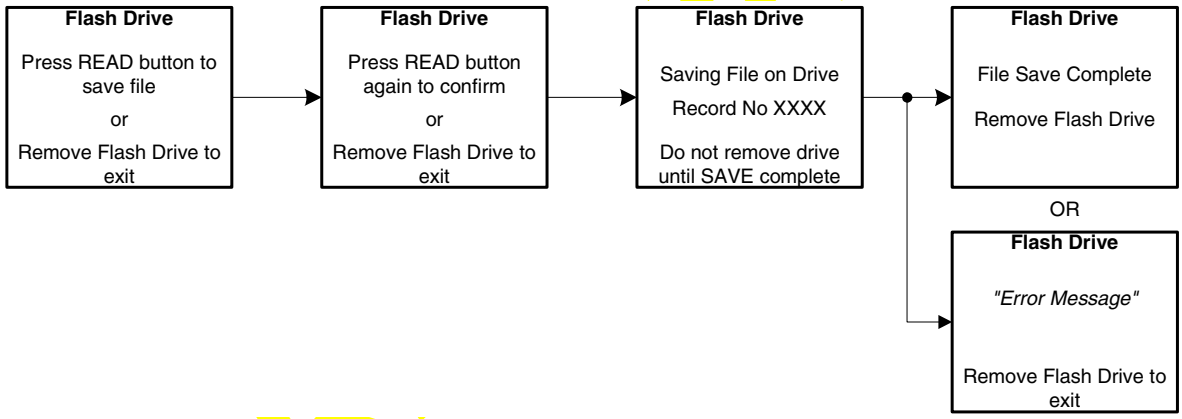


Figure 13
USB Flash Drive Screens

5 After the HHR displays **File Save Complete**, remove the USB Flash Drive from the HHR.

6 Connect the USB Flash Drive to the PC. The USB Flash Drive files directory window will be shown.

NOTE: If the directory window is not shown, use the Windows Explorer application on the PC to open the directory window.

7 Find the data records file.

NOTE: The data records file name starts with “HA” and is followed by six numbers. It will also have a .CSV text file extension.

NOTE: The data records file name has a different format than files that are transferred through a USB cable or Bluetooth device.

8 Copy the data file from the USB Flash Drive to any PC directory.

9 The file name can be changed to show the date it was saved, to make it easy to identify.

C. HHR Setup, Test, and Configuration

The HHR has screens that are used for setup, test, and configuration functions. The paragraphs that follow give information about how to use these functions. See Figure 14.

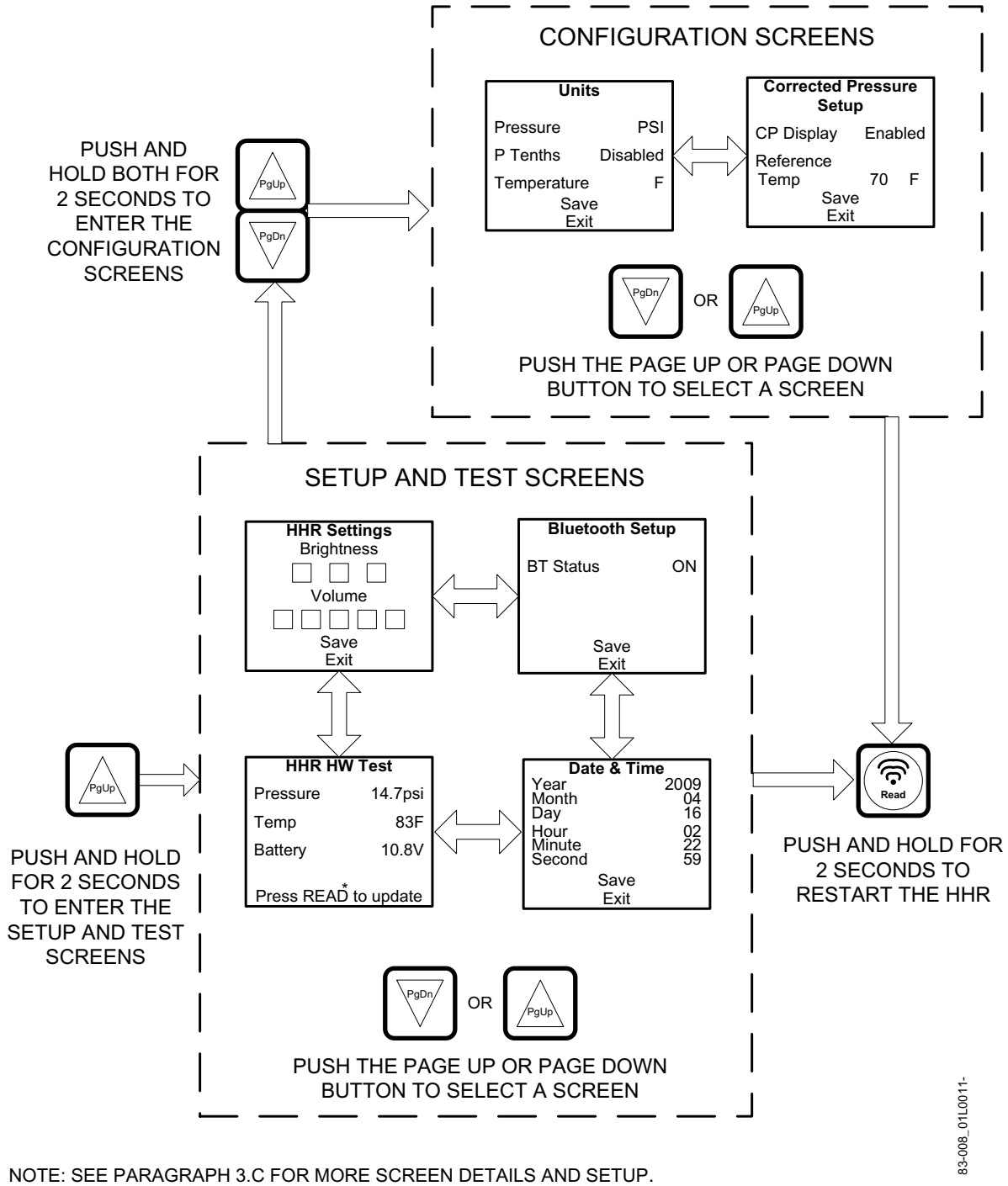
Individual Setup and Test screens are selected with the **PgUp** and **PgDn** buttons. The HHR Setup and Test screens are listed below:

- HHR Settings
- HHR HW Test
- Date and Time
- Bluetooth Setup.

The configuration screens that are used to change user-configurable settings are listed below:

- Units
- Corrected Pressure Setup.

TASK 32-49-09-990-814



NOTE: SEE PARAGRAPH 3.C FOR MORE SCREEN DETAILS AND SETUP.

Figure 14
Setup, Test, and Configuration Screens

(1) HHR Settings Screen

The **HHR Settings** screen (Figure 15) is used to set the HHR display brightness and the volume of the notification tone (beep).

TASK 32-49-09-990-815

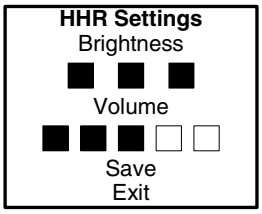


Figure 15
HHR Settings Screen

(a) Push and hold the **PgUp** button until the HHR beeps once.

(b) The **HHR Settings** screen is displayed.

(c) Push the **READ** button. **Brightness** is shown in red.

(d) Push the **PgUp** or **PgDn** buttons to change the display brightness.

(e) Push the **READ** button. **Volume** is shown in red.

(f) Push the **PgUp** or **PgDn** buttons to change the beep volume.

(g) Push the **READ** button. **Save** is shown in red.

(h) Push the **PgUp** or **PgDn** button to save. **Save** is shown in blue.

(i) Push the **READ** button. **Exit** is shown in red.

(j) Do one of the steps that follow:

- Push the **PgUp** or **PgDn** button to go to a different setup and test screen.
- Push and hold the **PgUp** and **PgDn** buttons for two seconds to go to the Configuration screens.
- Push and hold the **READ** button for 2 seconds to restart the HHR, and go to the startup screens.

(2) HHR HW Test Screen

The **HHR HW Test** screen (Figure 16) gives the current pressure, temperature, and battery voltage test results.

TASK 32-49-09-990-816

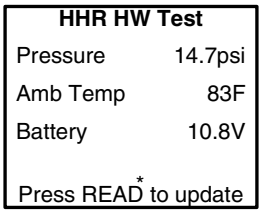


Figure 16
HHR Hardware Test Screen

(a) The HHR hardware screen displays the conditions that follow:

- Pressure: The ambient pressure measured by the barometer sensor in the HHR.
- Temperature: The ambient temperature measured by the temperature sensor found on the bottom of the HHR.
- Battery: The HHR battery voltage.

(b) Push the **READ** button to update the screen. An * is displayed to show the hardware conditions have been updated.

(c) Do one of the steps that follow:

- Push the **PgUp** or **PgDn** button to go to a different setup and test screen.
- Push and hold the **PgUp** and **PgDn** buttons for two seconds to go to the Configuration screens.
- Push and hold the **READ** button for 2 seconds to restart the HHR, and go to the startup screens.

(3) Date & Time Screen

The **Date & Time** screen (Figure 17) sets the HHR date and time.

TASK 32-49-09-990-817

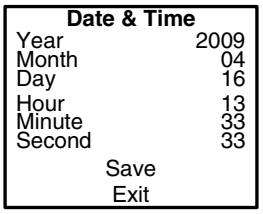


Figure 17
Date & Time Screen

(a) Push the **READ** button**. Year** is shown in red.

NOTE: The **READ** button can be pushed to select any date or time to be changed.

(b) Push the **PgUp** or **PgDn** buttons to change the year. The changed date is shown in red.

(c) Repeat steps (a) and (b) to set each date and time field.

(d) Push the **READ** button until **Save** is shown in red.

(e) Push the **PgUp** or **PgDn** button to save. When **Save** is shown in blue, the changes have been saved.

(f) Push the **READ** button. **Exit** is shown in red.

(g) Do one of the steps that follow:

- Push the **PgUp** or **PgDn** button to go to a different setup and test screen.
- Push and hold the **PgUp** and **PgDn** buttons for two seconds to go to the Configuration screens.
- Push and hold the **READ** button for 2 seconds to restart the HHR, and go to the startup screens.

(4) Bluetooth Setup Screen

The **Bluetooth Setup** screen (Figure 18) lets the user to turn the Bluetooth interface ON or OFF.

TASK 32-49-09-990-818

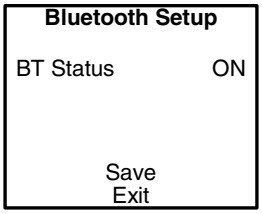


Figure 18
Bluetooth Setup Screen

(a) Push the **READ** button. **BT Status** is shown in red.

(b) Push the **PgUp** or **PgDn** set Bluetooth **ON** or **OFF** and is shown in blue to show it has been changed.

(c) Push the **READ** button. **Save** is shown in red.

(d) Push the **PgUp** or **PgDn** button to save. When **Save** is shown in blue, the changes have been saved.

(e) Push the **READ** button. **Exit** is shown in red.

(f) Do one of the steps that follow:

- Push the **PgUp** or **PgDn** button to go to a different setup and test screen.
- Push and hold the **PgUp** and **PgDn** buttons for two seconds to go to the Configuration screens.
- Push and hold the **READ** button for 2 seconds to restart the HHR, and go to the startup screens.

(5) Configuration Setup Screens

The configuration setup screens (Figure 19) let the user set the **Units** of measure that the HHR will display. The **Corrected Pressure Setup** screen enables this feature and sets the reference temperature for the corrected pressure algorithm.

TASK 32-49-09-990-819

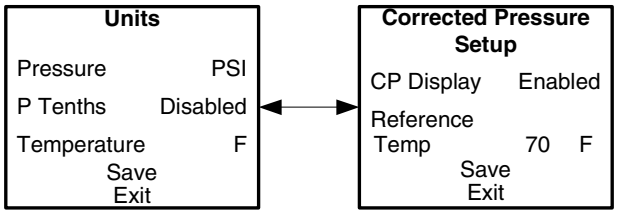


Figure 19
Configuration Setup Screens

(a) Make sure you are in a Setup or Test screen.

(b) Push and hold the **PgUp** and **PgDn** buttons until the HHR beeps once.

(c) The **Units** screen is displayed.

(d) Push the **READ** button**. Pressure** is shown in red.

(e) Push the **PgUp** or **PgDn** buttons to select **PSI**, **kPa** or **Bar**. This sets the units of measure the HHR will display for pressure. A change is shown in red.

(f) Push the **READ** button**. P Tenths** is shown in red.

(g) Push the **PgUp** or **PgDn** buttons to select **Enabled** or **Disabled**. This sets the HHR to display pressure in tenths. A change is shown in red.

(h) Push the **READ** button**. Temperature** is shown in red.

(i) Push the **PgUp** or **PgDn** buttons to select **F**arenheit or **C**elsius. This sets the units of measure the HHR will display for temperature. A change is shown in red.

(j) Push the **READ** button. **Save** is shown in red.

(k) Push the **PgUp** or **PgDn** button to save. When **Save** is shown in blue, the changes have been saved.

(l) Push the **READ** button. **Exit** is shown in red.

(m) Push the **PgUp** or **PgDn** button to enter the **Corrected Pressure Setup** screen.

(n) Push the **READ** button**. CP Display** is shown in red.

(o) Push the **PgUp** or **PgDn** buttons to select **Enabled** or **Disabled**. This sets the HHR to display the corrected pressure. A change is shown in red.

(p) Push the **READ** button. **Reference Temp** is shown in red.

(q) Push the **PgUp** or **PgDn** button to select the reference temperature. A change is shown in red.

NOTE: The function of reference temperature is to adjust the pressure measured by the TPS. Tire pressure is changed by the temperature of the tire gases. A user-configurable value can be used as the ambient tire temperature.

(r) Push the **READ** button. **Save** is shown in red.

(s) Push the **PgUp** or **PgDn** button to save. When **Save** is shown in blue, the changes have been saved.

(t) Push and hold the **READ** button for 2 seconds to restart the HHR.

NOTE: When in the configuration screens, the **Exit** function returns to the previous screen. You cannot return to the setup and test screens unless you restart the HHR.

D. TPS Data Records

(1) Stored Data Record Screen

The **Data Record** screen (Figure 20) displays data received from the TPS. The data record gives four types of information:

- Record Date and Time
- TPS Data
- HHR Reference Data
- Record Number.

The Record Date and Time shows when the TPS was read. TPS Data gives the TPS part and serial number, measured pressure and temperature, corrected pressure settings and channel status. HHR Reference Data is given to show the ambient pressure and temperature conditions of the reader, during the measurement. The Record Number is a sequential record number given by the HHR.

TASK 32-49-09-990-820

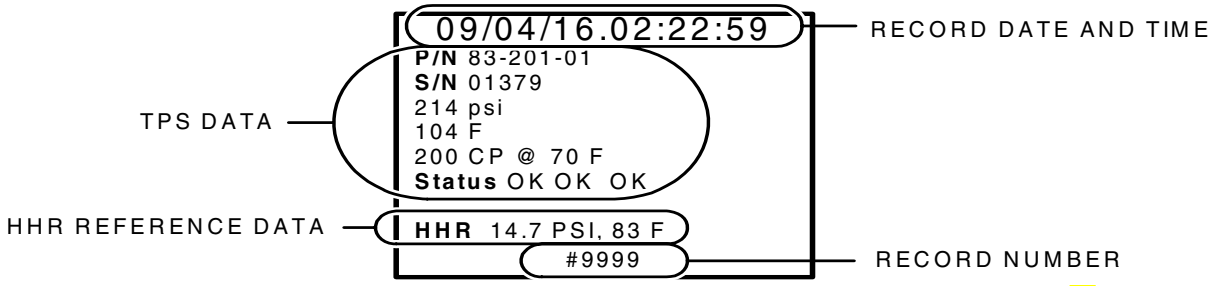


Figure 20
TPS Data Record Screen

(2) Enter the Data Record Screen

(a) Push and hold the **PgDn** button until the HHR beeps once.

(b) The last stored data record is displayed.

(c) The data record number is displayed at the bottom of the screen.

(d) The date and time that the data record was created is displayed at the top of the screen.

(e) TPS data is displayed below the record date and time.

(f) The barometric pressure and temperature of the HHR is displayed above the data record number.

NOTE: These are given for reference only.

(g) Use the **PgDn** and **PUp** buttons to show other stored data records.

(h) Push the **READ** button to return to restart the HHR.

(3) Data Records File Management

NOTE: The maximum number of data records that the HHR can store is limited to 10,000 (0000 - 9999).

(a) If the HHR has no available memory to store a data record, the Memory Full message is displayed and the Read function is disabled (Figure 21).

NOTE: See step 3.G.(1).(c) for more information about data record storage messages.

(b) Data records will must be deleted before new records can be stored.

TASK 32-49-09-990-821

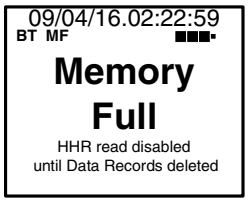


Figure 21
Memory Full Screen

(4) Contents of the Data Records File

- The data record files are ASCII file with comma-delimited fields and can be imported into Excel or a similar spreadsheet application.
- Line 1 contains the header labels, and the other lines contain the data shown in Table 3.

TASK 32-49-09-991-803

Table 3
Contents of Data Records File

Header Label	Format	Description
Record #	#XXXX	The four Xs specify the record number (0000 - 9999)
ReaderID	HHR_XXXXXX	The six Xs specify the unique reader ID
Time	yyyy/MM/ dd.HH:mm:ss	HHR time - recorded at the end of the read
Part Number	P/N	TPS device part number
Serial Number	S/N	TPS device serial number
Avg Pressure	N/A	TPS Pressure - Channel Average
P Units	psi or BAR or kPa	Units of TPS Pressure
Avg Temperature	N/A	Average Temperature
T Units	°C or °F	Units of Average Temperature
Cor Pressure	CP @XXF	Corrected Pressure Reference Temperature (Optional) (XX = User selected value)
CP Units	°C or °F	Units of Corrected Pressure
Amb Temp	N/A	Ambient Temperature
AmbT Units	°C or °F	Units of Ambient Temperature
Amb Pressure	N/A	Ambient Pressure
AmbP Units	psi or BAR or kPa	Units of Ambient Pressure
CH Status	Channel 1, 2, 3 (Example: OK OK OK)	OK - valid read
		RE - Read Error (channel transmission corrupted)
		LE - Limit Error (channel pressure variable error)
		ME - Memory Error (TPS memory mismatch or corrupted)

E. TPS Interrogation Process

(1) TPS Read-In-Progress

The TPS **Reading** screen is shown in Figure 22. When the HHR starts to interrogate the TPS, one asterisk (*) is displayed in the center of the display screen. If the HHR finds a TPS, the interrogation continues and shows three asterisks. Five asterisks are displayed if the TPS is successfully read, and then the TPS results screen will be displayed (see Figure 8). If the HHR cannot locate a TPS, **TPS Not Detected** is displayed.

TASK 32-49-09-990-822

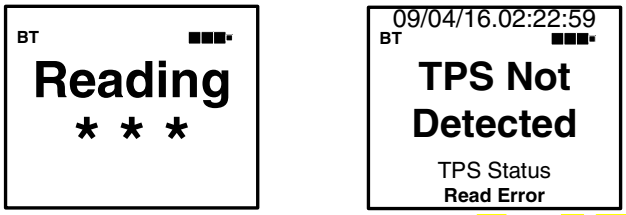


Figure 22
TPS Reading Screen

(2) Corrected Pressure (CP)

Corrected Pressure (CP) is TPS pressure that is adjusted for wheel temperature factors that affect tire pressure. The amount of correction is set by the user. The CP values are set in the configuration setup screens.

The HHR uses an algorithm based on the Ideal Gas Law to calculate CP. The CP formula is given below:

Corrected Pressure = $(P_{TPS} (T_{REF} / T_{TPS})) - P_{AMBIENT}$

P_{TPS} = TPS Pressure (PSIA)

T_{REF} = Reference temperature (K) (User specified)

T_{TPS} = TPS Temperature (K)

$P_{AMBIENT}$ = Ambient pressure sensor reading (PSI)

A reference temperature based on a cold tire (ambient) temperature is compared to the current TPS pressure and temperature. A temperature change of 5° F (3° C) causes an approximately one percent (1%) change in pressure.

Typical use for CP is to give an accurate pressure when the tire is above ambient temperature. CP estimates the ambient pressure level of a hot tire.

Example:

The tarmac has an average ambient temperature of 75 °F at mid-day. The user could set the CP reference temperature to 75 °F. After landing, tire and wheel temperature is much greater than ambient. When the tire gas temperature is above the ambient reference, CP gives a corrected tire pressure.

(a) Corrected Pressure Setup

1 Do the steps in paragraph 3.C.(5) to the enter the **Configuration Setup** screens and change the HHR Corrected Pressure values.

(b) Corrected Pressure Display Screen

1 Do the steps in paragraph 3.B.(2) to view the Corrected Pressure screen.

(c) Corrected Pressure Values in a Data Record

1 Do the steps in paragraph 3.D.(2) to view the Data Record Screens.

2 Figure 23 shows the Corrected Pressure values that are given below:

200 psi	Corrected Pressure
@ 70 F	Reference Temperature
HHR 14.7 PSI, 83 F	HHR Ambient Pressure and Temperature

TASK 32-49-09-990-823

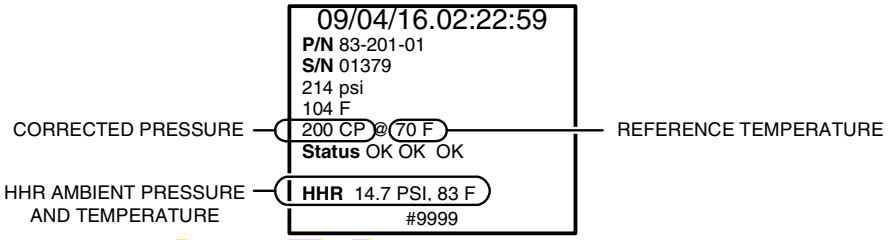


Figure 23
Corrected Pressure in the Data Record Screen

F. TPS Interrogation Error and Warning Messages

(1) One Channel Errors

Figure 24 shows the TPS Status screen after a successful interrogation with one channel error.

TASK 32-49-09-990-824

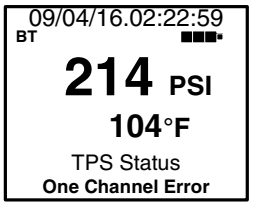


Figure 24
TPS Status Screen with One Channel Error

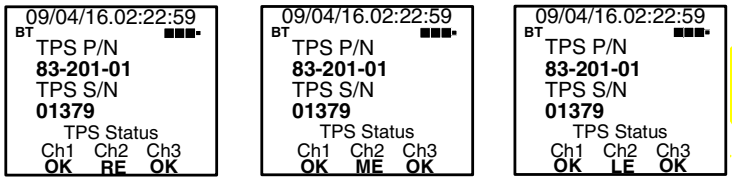
One of three TPS error types may have occurred:

- TPS Read Error (RE)
- TPS Memory Error (ME)
- TPS Limit Error (LE)

To find the affected TPS channel and error type, push the **PgDn** button, until the **Part Data** screen shows (Figure 25).

NOTE: This example shows an error on Channel 2.

TASK 32-49-09-990-825



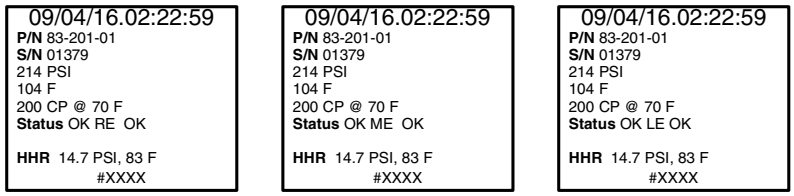
READ ERROR MEMORY ERROR LIMIT ERROR

Figure 25
Part Data Screens with One Channel Error

Figure 26 shows **Data Record** screens. Channels errors are given next to **Status**.

NOTE: This example shows an error on Channel 2.

TASK 32-49-09-990-826



READ ERROR MEMORY ERROR LIMIT ERROR

Figure 26
TPS Data Record Screens with One Channel Error

(2) Two Channel Errors

Figure 27 shows the error messages that are given on the TPS Status screen when there are two channel errors.

TASK 32-49-09-990-827

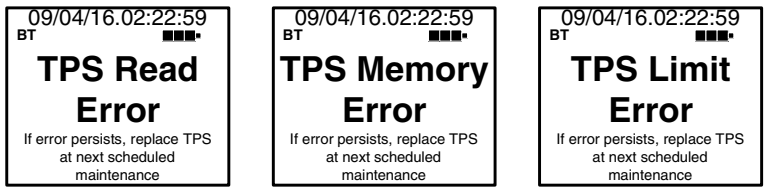


Figure 27
Two Channel Error Screens

Figure 28 shows the **Data Record** screen if there are two channel errors. Channel errors can be any combination of read (RE), memory (ME) or limit (LE) errors. The result of the single valid channel is stored in the record file.

NOTE: In this example, channel one shows a read error and channel two shows a memory error.

TASK 32-49-09-990-828

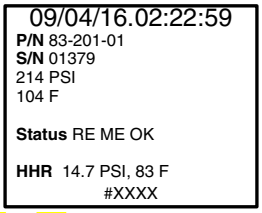


Figure 28
Data Record Screens with Two Channel Errors

(3) TPS Overpressure Warning

Figure 29 shows the **Tire Overpressure Warning** message that shows if the pressure readings on all three channels is greater than 350 psig. The user must press any button to clear the message.

TASK 32-49-09-990-829

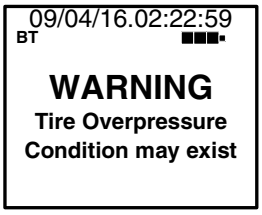


Figure 29
Tire Overpressure Warning Screen

Figure 30 shows that the **Data Record** has a pressure of "**35X**" and corrected pressure is not given. TPS Status will show limit errors (LE).

TASK 32-49-09-990-830

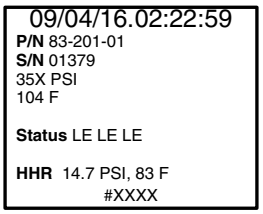


Figure 30
Tire Overpressure Data Record

G. HHR Status Icons, Warning Messages, and Fault Messages

(1) HHR Status Icons and Warning Messages

(a) Bluetooth Status Icon

The Bluetooth status is displayed with a **BT** symbol in the upper left of the HHR screens (Figure 31).

The color of the **BT** symbol gives the Bluetooth status as given below:

Off	Not Displayed
On but not connected	Green
Connected	Blue

TASK 32-49-09-990-831

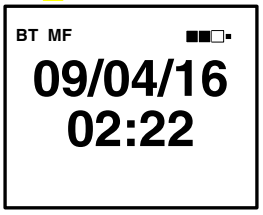


Figure 31
HHR Status Icons

(b) Battery Status Icon and Warning Message

The HHR battery status is displayed in the upper right of the HHR screens (Figure 31). There are three segments displayed. The battery status is checked after every TPS interrogation.

NOTE: Figure 31 shows the battery condition with two filled segments.

Filled segments of the battery status icon give the battery condition as follows:

Good	Three filled segments
Medium	Two filled segments
Low	One filled segment
Fail	No filled segments

If the battery condition is at a critical level, a Low Battery warning message will be displayed (Figure 32). It will be necessary to charge or replace the battery as given in paragraph 3.A.

TASK 32-49-09-990-832

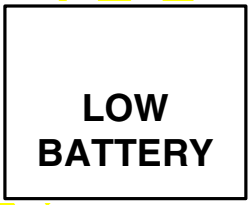


Figure 32
Low Battery Warning Screen

(c) Memory Status Icon and Warning Message

The HHR stores a maximum of 10,000 (0000 - 9999) data records. If the number of stored records is more than 8,999 (90%), **MF** is displayed in the upper left of the HHR screen.

If the HHR cannot store any data records, a **Memory Full** message is displayed and the Read function is disabled (Figure 33). Data records need to be deleted before more records can be stored.

TASK 32-49-09-990-833

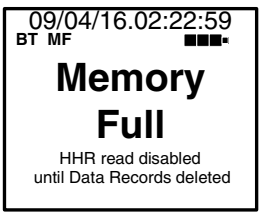


Figure 33
Memory Full Warning Screen

(2) HHR Fault Message

An HHR fault message can indicate that the HHR may not function correctly or is not available to the user (Figure 34). Refer to paragraph 4 in TESTING AND FAULT ISOLATION for a description of fault codes.

NOTE: In Figure 34, “X” is any fault code.

TASK 32-49-09-990-834

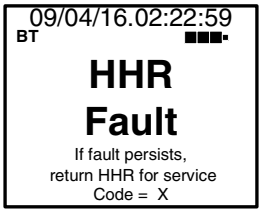


Figure 34
HHR Fault Screen

4. PC eHHR-SW Installation and Operation

The PC eHHR-SW software (IPL Figure 1, item 35) installs the HHR User GUI and USB driver on a PC. The primary function of the HHR User GUI is to transmit and retrieve data records. The HHR User GUI allows the HHR to be tested and configured from the PC.

NOTE: The screen images used in this procedure are from a PC with the Windows XP operating system.

A. Installation of the eHHR Software

(1) Put the eHHR-SW disc into the CD or DVD drive of the PC.

(2) Software installation will start automatically.

NOTE: If installation does not start, select the **setupV1.00.exe** file.

(3) When the **HRR GUI Initial Setup** window opens, and then click the **Install** button (Figure 35).

TASK 32-49-09-990-835

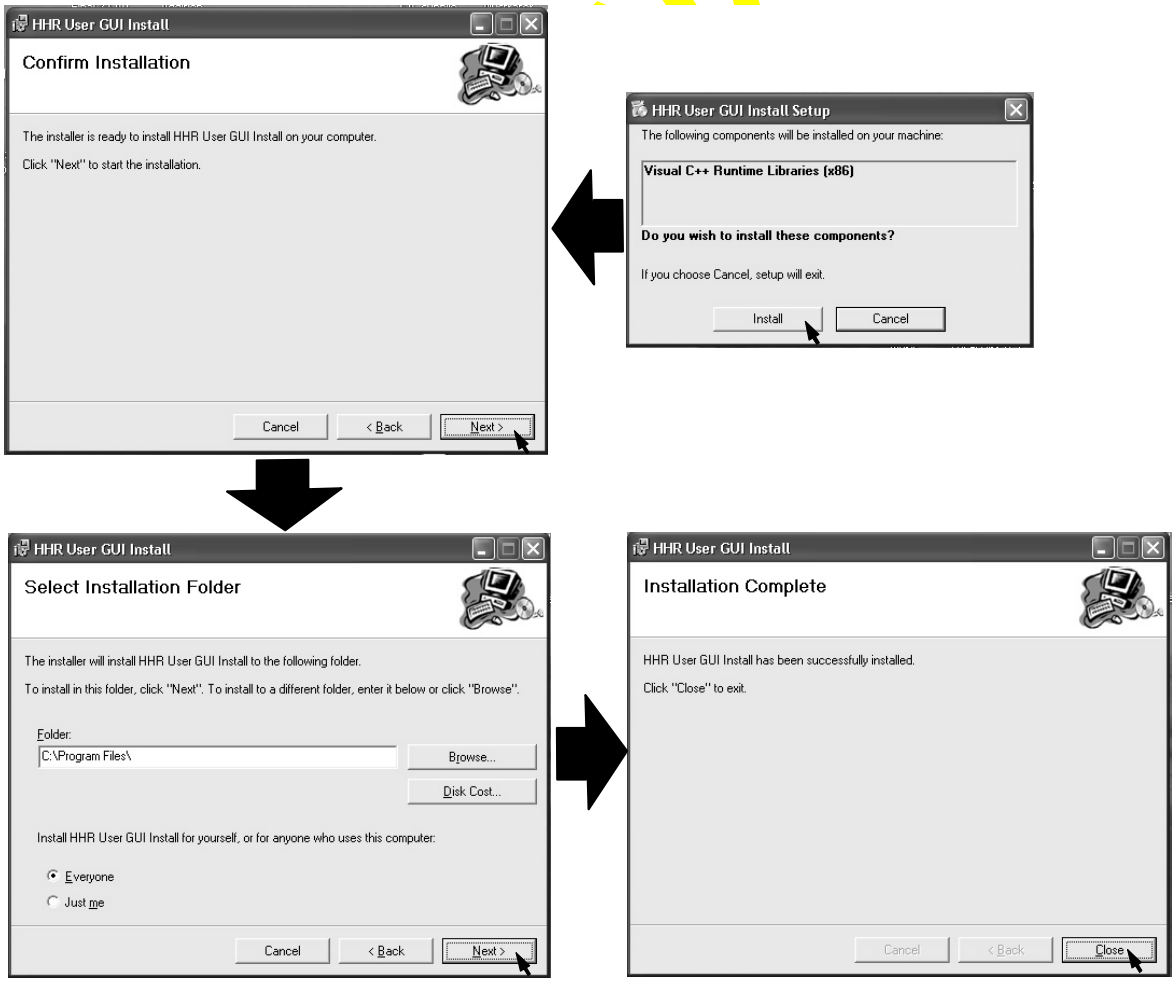


Figure 35
PC Software Installation Windows

(4) When the **Confirm Installation** window opens, click the **Next** button.

(5) When the **Select Installation Folder** widow opens, click the **Next** button.

NOTE: The default file location is C:\Program Files\. Do not change this location.

(6) When the **Installation Complete** window opens, click **Close**.

B. Installation of the USB Driver

During the eHHR PC-SW software installation, a file folder is created to store the USB hardware drivers. These files must be extracted from the **CDM 2.04.14.zip** file before the HHR USB hardware setup.

(1) Use Windows Explorer to find the USB Drivers folder in the HandHeldReader folder (Figure 36).

TASK 32-49-09-990-836

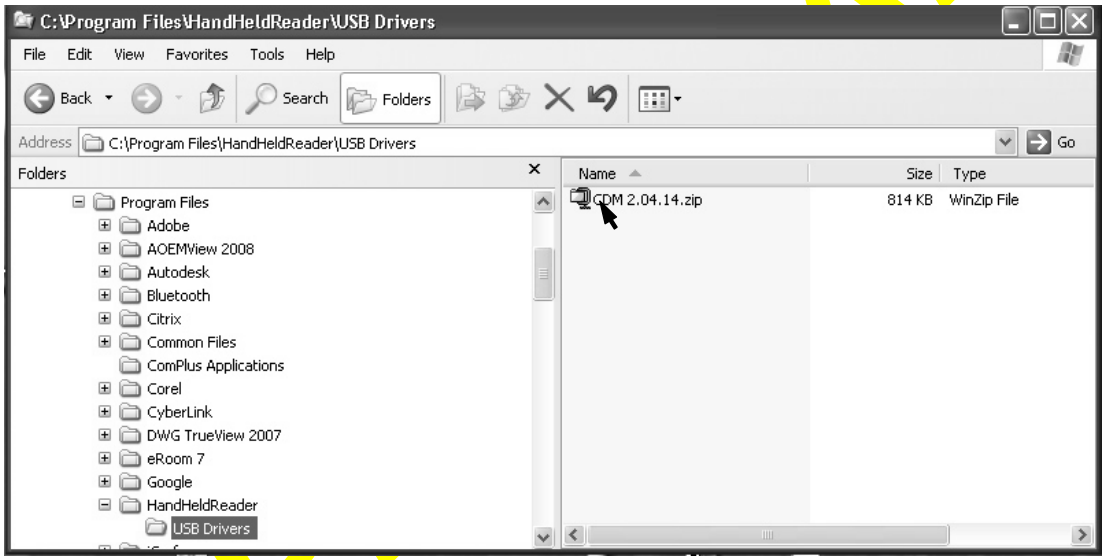


Figure 36
USB Driver Folder Location

(2) Double click the CDM 2.04.14.zip file.

NOTE: Winzip and other similar programs can be used to unzip (extract) this file. Winzip is not included on the installation disc. There are several freeware versions of this software.

(3) Extract the files from the CDM 2.04.14.zip file to a location that you can find when the HHR is connected. For example, extract the files to C:\USB Driver as shown in Figure 37.

TASK 32-49-09-990-837

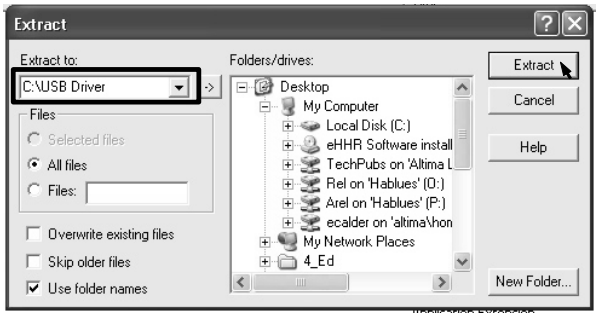


Figure 37
Unzip the USB Driver

(4) Connect the mini-connector end of the USB cable to the HHR, and then connect the other end to the PC.

(5) Push the **READ** button on the HHR.

(6) After approximately two seconds, the PC will show the message, “New Hardware Found”. The **Welcome to the Found New Hardware Wizard** window is displayed (Figure 38).

TASK 32-49-09-990-838

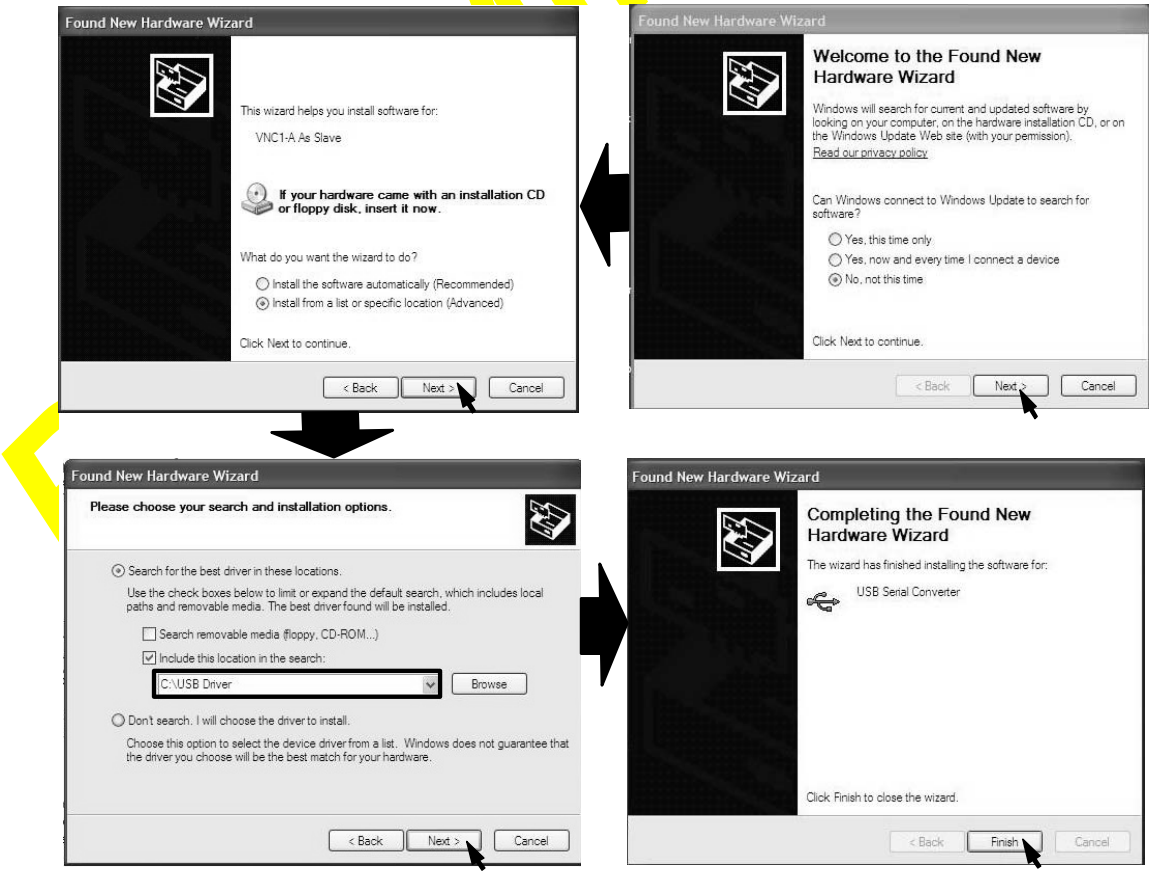


Figure 38
New Hardware Wizard Windows

(7) When Windows asks to connect to Windows Update, select **No, not this time** button, and then click **Next**.

(8) When the install wizard asks to help you install software for **VNC1-A As Slave**, select **Install from a list or specific location (Advanced)**, and then click the **Next** button.

(9) When Windows asks for search and installation options, select **Include this location in the search:**, and then click the **Browse** button.

(10) Find the folder that contains the extracted files extracted from the CDM 2.04.14.zip in step (3), and then click the **Next** button.

(11) After the USB Serial Converter driver has been installed, click the **Finish** button.

(12) The USB Serial Port driver will then be installed. When installation is complete, click the **Finish** button.

C. HHR User GUI Operation

The HHR User GUI (Figure 39) does five major functions with the HHR:

- Activates the Serial Port
- Loads firmware to the HHR
- Performs functional tests
- Sets the Configuration
- Manages data records.

(1) Enable the Serial Port

(a) Start the HHR User GUI software.

(b) Use a USB cable to connect the HHR to the PC.

NOTE: Use only the USB mini-connector port on the HHR. The standard USB connector is for use with a Flash Drive or similar USB device.

TASK 32-49-09-990-839

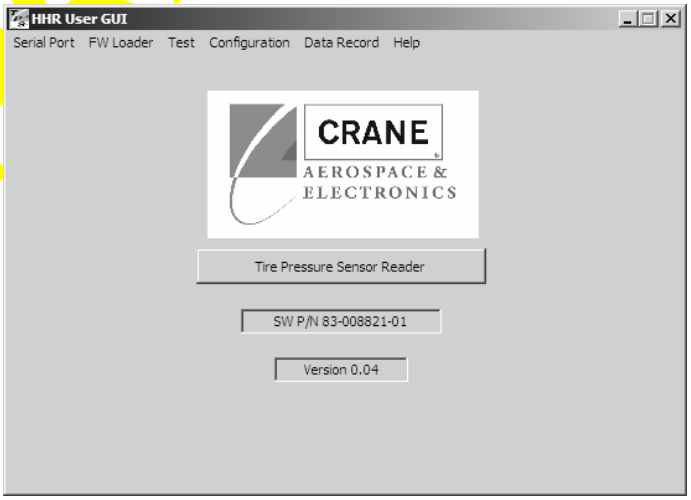


Figure 39
HHR User GUI Main Window

(c) Push the **READ** button on the HHR.

(d) Select **Serial Port>Select** from the User GUI menu bar to open the **Serial Port Connection** window (Figure 40).

(e) **No COM Selected** is given in the dialog box.

(f) Find the COM port that the PC has assigned to the HHR.

NOTE: The COM port assigned by the PC depends on the COM ports in use.

(g) Select the COM port number, and then click the **SELECT** button.

(h) **COM XX Opened** is displayed in the dialog box.

NOTE: XX is the COM port number assigned by the PC.

NOTE: If the HHR is turned off, the HHR User GUI will stop communication through the COM port. **The Serial Port Selection** window may continue to show the COM port is opened. Click the **SELECT** button to restart serial communication.

NOTE: If both a USB Cable and Bluetooth connection are available, only one COM port can be used. To change the connection, the current COM port must be released. Click the **RELEASE** button, and then change the COM port and click the **SELECT** button.

(i) Close the **Serial Port Selection** window.

TASK 32-49-09-990-840

Figure 40
Serial Port Window

(2) Load Firmware to the HHR

The Firmware (FW) Loader is used to change the HHR firmware. There are no firmware updates at this time.

NOTE: The serial port must be enabled before any of the steps that follow can be done.

(a) Copy the HHR host and reader firmware hex files into the C:\Program Files\HandHeldReader folder (Figure 41).

NOTE: The host and reader firmware hex files will be identified in a revision of this CMM, if updates are required.

TASK 32-49-09-990-841

Figure 41
Firmware File Location

(b) Select **FW Loader>Upgrade** from the User GUI menu bar to open the **Firmware Program Loader** window (Figure 42).

NOTE: The **Current Step / Response Msg** field shows progress and steps needed to load firmware.

TASK 32-49-09-990-842

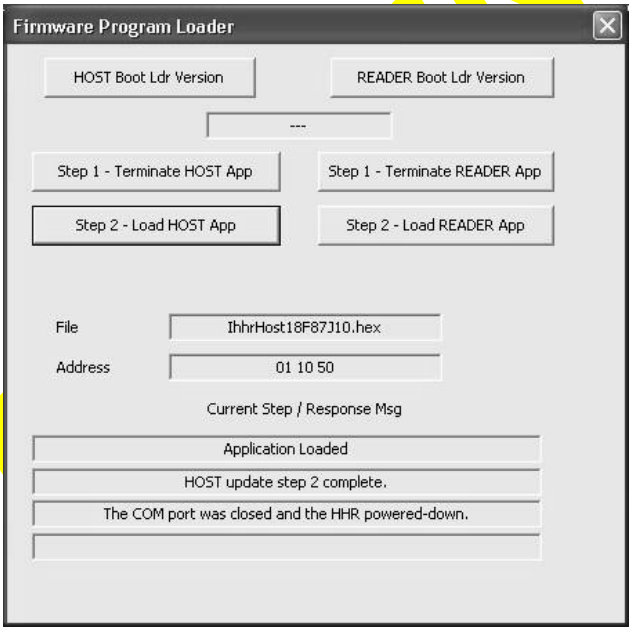


Figure 42
Firmware Loader Window

(c) Load the Host Firmware

1 Click the **Step 1 - Terminate HOST App** button.

2 The HHR power will go off.

3 Push the **READ** button on the HHR.

4 **Boot Loader** is shown on the HHR display screen (Figure 43).

5 Close the **Firmware Program Loader** window.

TASK 32-49-09-990-843

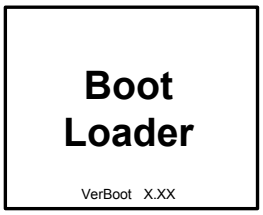


Figure 43
HHR Boot Loader Screen

6 Do paragraph 4.C.(1) to enable the serial port.

7 Select **FW Loader>Upgrade** from the User GUI menu bar to open the **Firmware Program Loader** window.

8 Click the **Step 2 - Load HOST App** button to load the Host firmware.

NOTE: This process takes approximately 7 minutes to complete.

9 When the host firmware is loaded, **"Application Loaded"** will show in the **Current Step / Response Msg** field.

(d) Load the Reader Firmware

1 Click the **Step 1 - Terminate READER App** button.

2 Click the **Step 2 - Load READER App** button to load the Reader firmware.

NOTE: This process takes approximately 7 minutes to complete.

3 The HHR will show an **HHR Fault** message screen (Figure 44).

TASK 32-49-09-990-844

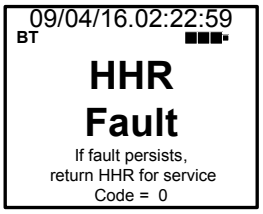


Figure 44
HHR Fault Screen

4 When the reader firmware is loaded, **"Application Loaded"** will show in the **Current Step / Response Msg** field.

(3) Functional Tests

NOTE: The serial port must be enabled before any of the steps that follow can be done.

(a) Select **Test>HHR** from the User GUI menu bar to open the **HRR Peripherals** window (Figure 45).

TASK 32-49-09-990-845

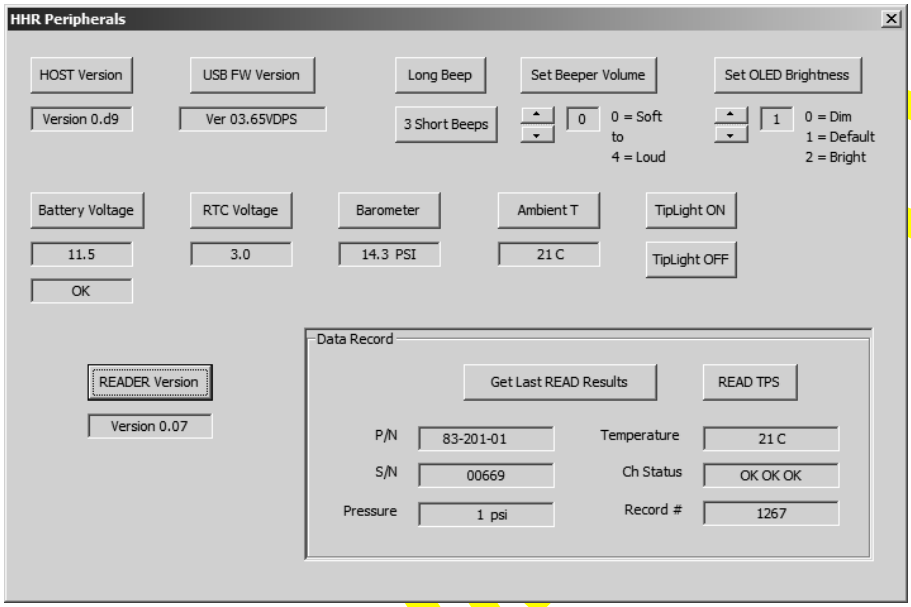


Figure 45
HHR Peripherals Window

(b) Current status of the HHR is given when any of the buttons that follow are selected:

- **HOST Version**
- **USB FW Version**
- **Battery Voltage** and
- **RTC Voltage** (Real Time Clock battery voltage) for date and time
- **Barometer** ambient value
- **Ambient T**emperature
- **READER Version**.

(c) The **TipLight ON** or **TipLight OFF** buttons test the tip light function.

(d) Change the value in the dialog box under the **Set Beeper Volume** and **Set OLED Brightness** buttons. Click the applicable button to set the HHR value.

(e) In the **Data Record** field, click the **READ TPS** button.

(f) Click the **Get the Last READ Results** button, to show the last valid data record saved on the HHR.

(g) Select **Test>Read-Write Memory** from the User GUI menu bar to open the **Read & Write TPS Block Memory** window (Figure 46).

TASK 32-49-09-990-846

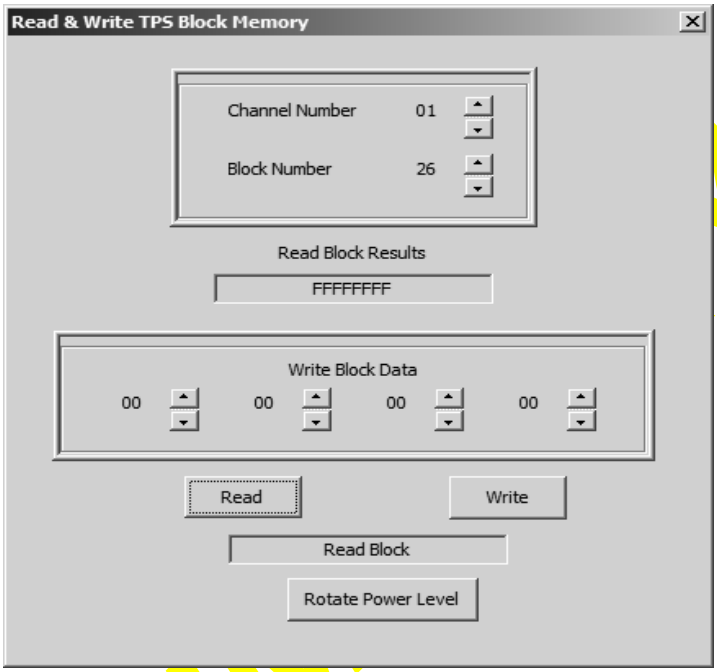


Figure 46
Read & Write TPS Block Memory Window

(h) Use the up and down arrows in the **Write Block Data** fields to create a hexidecimal word. It will be written to the user memory blocks (blocks 27 and 27) of theTPS.

NOTE: A typical example is to write 00000000 to set all bits low or FFFFFFFF to set all bits high.

(i) Click the **Write** button to send the memory word to the selected user memory block of the TPS.

(j) Click the **Read** button to make sure the TPS memory stored the memory word.

(k) Use the up and down arrows to select a Channel Number (01 thru 03) and Block Number (26 or 27). Repeat steps (h) thru (j) for each memory channel and block.

(4) Configuration Settings

NOTE: The serial port must be enabled before any of the steps that follow can be done.

(a) Select **Configuration>RTC** from the User GUI menu bar to open the **Configuration - Real Time Clock (RTC)** window (Figure 47).

TASK 32-49-09-990-847

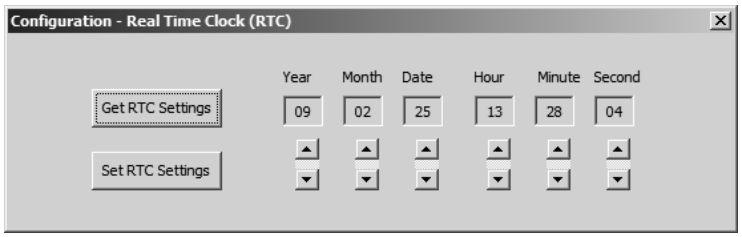


Figure 47
Real Time Clock Configuration Window

(b) Click the **GetRTC Settings** button to read the RTC data from the HHR.

(c) Use the up and down arrows to change to the necessary day and time.

(d) Click the **SetRTC Settings** button to change the HHR RTC.

(e) Select **Configuration>System** from the User GUI menu bar to open the **Configuration - System Parameters** window (Figure 48).

TASK 32-49-09-990-848

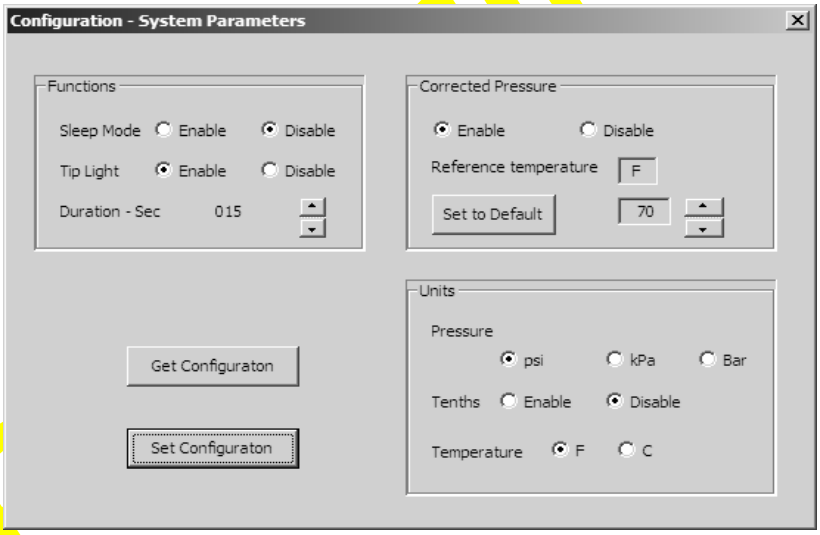


Figure 48
Configuration - System Parameters Window

(f) Click the **Get Configuration** button to show the HHR function settings.

(g) Use the buttons in the **Functions** field to **enable** or **disable** sleep mode and the tip light.

NOTE: Sleep mode powers off the HHR to conserve battery life.

(h) Use the up and down arrows to set **Duration - Sec** for the amount inactivity needed to put the HHR in sleep mode.

(i) In the **Units** field, select how the HHR will display pressure and temperature.

(j) In the **Corrected Pressure** field, click the **Enable** or **Disable** button.

(k) See paragraph 3.E.(2) for corrected pressure setup.

(l) To change the corrected pressure **Reference temperature**, click the up and down arrows.

NOTE: If the **Set to Default** button is clicked, reference temperature is reset to 70 °F (21 °C).

(m) Click the **Set Configuration** button to update the system parameters.

NOTE: Click the **Get Configuration** button to verify any changes.

(5) Data Records

NOTE: The serial port must be enabled before any of the steps that follow can be done.

(a) Select **Data Record>Records** from the User GUI menu bar to open the **Data Records** window (Figure 49).

TASK 32-49-09-990-849

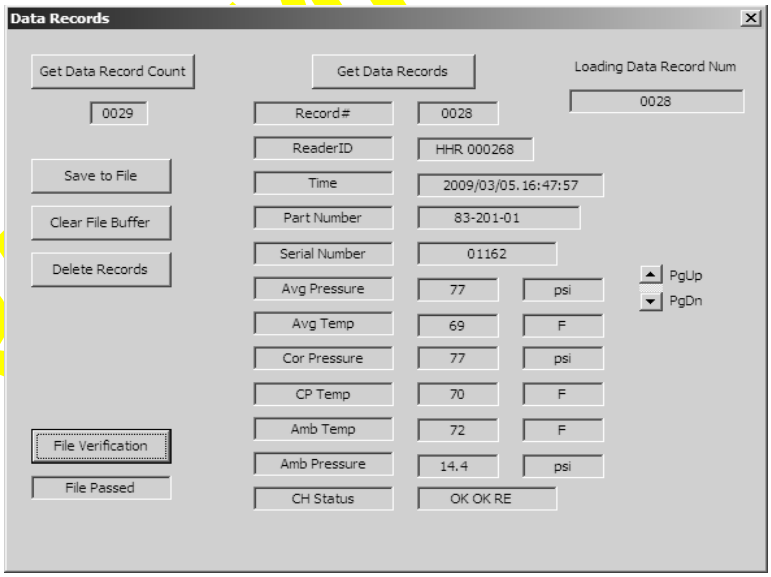


Figure 49
Data Records Window

(b) Data record information is shown in the middle of the window. This is the same data record information that is displayed on the HHR.

(c) Click the **Get Data Record Count** button, to show the total number of data records stored on the HHR.

(d) Click the **Get Data Records** button to load all data files from the HHR. **Loading Data Record Num** will show the data records as they are loaded to the PC.

NOTE: When loading is complete, the last record loaded will be one less than the record count, because the first record number is 00.

(e) Click the **PgUp** and **PgDn** buttons to view each data record.

(f) Click the **Save to File** button, to write the data records to the PC.

(g) The **Save As** window will be displayed (Figure 50).

(h) Select a folder on the PC to store data records, and then click the **Save** button.

NOTE: When PC eHHR-SW software is installed, it does not make a folder to store HHR data records. A folder should be made.

(i) After the data record file is stored, the data files on the HHR can be deleted. Click the **Delete Records** button to clear erase all data files stored on the HHR.

(j) Click the **Clear File Buffer** button, to clear any data files held in the HHR buffer memory.

TASK 32-49-09-990-850

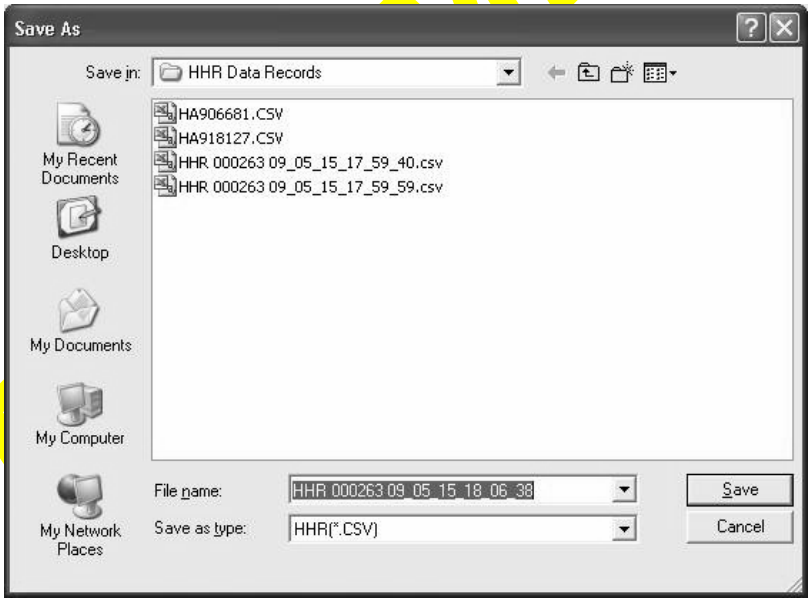


Figure 50
Data Records - Save and Verify Window

TASK 32-49-09-750-801

1. General

A. Overview

The Handheld Reader (HHR) does automatic self-tests during normal operation. Manual test procedures are also given to check the accuracy of the HHR internal barometer. This section contains information about these tests.

Battery charger and HHR fault isolation data is given in paragraph 4.

Table 1001 gives the ambient test conditions necessary for the automatic and manual tests.

TASK 32-49-09-991-804

Table 1001
Test Conditions

CONDITION	MINIMUM	MAXIMUM
Ambient Temperature	15.5 °C (60 °F)	32.2 °C (90 °F)
Humidity	–	90%
Ambient Pressure	–	–

B. Test Description

The paragraphs below give a brief description of the tests available for the HHR.

(1) Internal Barometer Accuracy Check

This is a manual test to make sure that the HHR internal barometer gives an accurate ambient pressure (see paragraph 2).

(2) Automatic Self-Tests

These tests are done automatically each time the HHR is powered up (see paragraph 3).

2. Internal Barometer Accuracy Check

Do the steps below to make sure that the HHR internal barometer is accurate.

NOTE: The internal barometer is used to correct the pressure measured by the Tire Pressure Sensor (TPS) only. This procedure is used when the sensor (psig (s)) method of altitude adjustment is selected in the **Units Configuration** window. Refer to paragraph 3.C.(5) in DESCRIPTION AND OPERATION to change the method used for altitude adjustment.

NOTE: The internal barometer cannot be calibrated. It can only be compared to a standard for accuracy. If the internal barometer is not accurate, the HHR must be replaced.

Table 1002 gives the test equipment necessary for the internal barometer accuracy check. Any equivalent replacement can be used.

TASK 32-49-09-991-805

Table 1002
Test Equipment

ITEM	MANUFACTURER/SPECIFICATION	USAGE
Local Barometric Standard	Commercial/ ± 0.04 psi (minimum)	Compare to internal barometer

(1) Push the **READ** button on the HHR. An initial screen will display the firmware (FW) part number and version. After eight seconds, the date and time are displayed.

(2) Push and hold the **PgUp** button for 2 seconds to enter the **HHR Settings** screen.

(3) Use the **PgDn** button to display the **HHR HW Test** screen (Figure 1001).

TASK 32-49-09-990-851

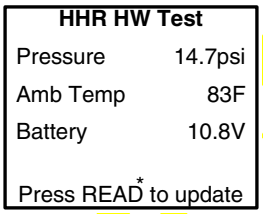


Figure 1001
HHR Hardware Test Screen

(4) The HHR internal barometer indication is shown as Pressure. Push the **READ** button to update the test data.

(5) Make sure that the HHR internal barometer pressure is equal to the local barometric standard ± 0.2 psi.

3. Automatic Self-Tests

A. Automatic tests are done upon power up and each time the **READ** button is pushed. If a test fails, it will display a fault message and disable the HHR Read function. See paragraph 4 for a description of the fault messages.

B. A **Low Battery** message will be displayed when the battery does not have enough charge for the HHR to function (Figure 1002). After the low battery message is displayed, the HHR power will go off. To continue operation, install a fully charged battery. Refer to DESCRIPTION AND OPERATION, paragraph 3.A, to charge the battery.

TASK 32-49-09-990-852

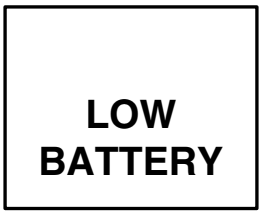


Figure 1002
Low Battery Message

TASK 32-49-09-810-801

4. Fault Isolation

A. Battery Faults

There are two failures that are shown by the battery charger. The red LED on the battery charger shows that the battery temperature correct. If the red LED blinks, the battery is cold. If the red LED stays on, the battery is hot. If the red LED blinks or is on, do the steps that follow:

(1) Remove the battery from the battery charger.

(2) Disconnect the battery charger power plug from the wall outlet.

(3) Clean the battery and battery charger contacts. See CLEANING.

(4) Connect the battery charger power plug to the wall outlet.

(5) Install the battery in the battery charger.

(6) If the fault condition continues, replace the battery.

(7) If a new battery continues to show a fault, replace the battery charger.

B. Internal Barometer Check Fault

If the HHR fails the internal barometer accuracy check in paragraph 2, replace the HHR.

C. HHR Faults

If a fault occurs, the **HHR Fault** message is displayed with a fault code (Figure 1003). When a fault message is displayed the HHR Read function is disabled. If the fault continues, returned the HHR for service. Table 1003 gives a list of fault codes.

NOTE: In Figure 1003, “X” can be any of the fault codes shown in Table 1003.

NOTE: When firmware is being loaded to the HHR, fault code 0 is displayed until the process is complete.

TASK 32-49-09-990-853

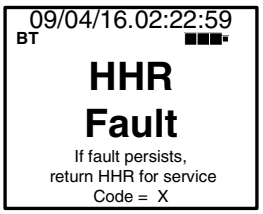


Figure 1003
HHR Fault Message

TASK 32-49-09-991-806

Table 1003
HHR Fault Codes

CODE	FAULT	CODE	FAULT
0	Boot Loader Running	6	Real Time Clock (RTC)
1	RF Loop-back Test	7	RTC Battery
2	Algorithm Test	8	USB Software Version
3	Not Used	9	Not Used
4	Not Used	A	Ambient Pressure Sensor
5	Not Used	B	Ambient Temperature Sensor

D. TPS Interrogation Errors

The TPS Interrogation errors described in paragraph 3.F of DESCRIPTION AND OPERATION are usually caused by faults in the TPS.

DISASSEMBLY

TASK 32-49-09-000-801

1. General

A. HHR Battery Removal

The only disassembly procedure applicable to the HHR is the removal of the battery pack for recharge or storage. Do the steps below to remove the battery from the HHR.

(1) Press the tabs on both sides of the battery to release the battery from the HHR.

(2) Pull the battery away from the HHR.

TASK 32-49-09-990-854

Figure 3001
HHR Battery Removal

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CLEANING

TASK 32-49-09-100-801

1. General

Table 4001 gives the necessary materials for cleaning. Equivalent replacements can be used for the cleaning materials.

TASK 32-49-09-991-807

Table 4001
Cleaning Materials

MATERIAL	SPECIFICATION	USAGE
General Purpose Household Cleaner	Commercial	External cleaning
Stiff Bristle Non-Metal Brush	Commercial	Clean the temperature sensor
Cloth or Paper Towel	Commercial	Dry parts after cleaning
Rubber Eraser	Commercial	Cleaning battery contacts
Isopropyl Alcohol	Commercial	Cleaning battery contacts
Cotton Tip Swab	Commercial	Cleaning battery and battery charger contacts

2. Clean the Battery Contacts

A. Use the rubber eraser to remove corrosion and contamination from the battery contacts.

B. Use isopropyl alcohol and a cotton tip swab to remove residue.

3. Clean the Battery Charger Contacts

A. Disconnect the battery charger power plug from the wall outlet.

B. Use the rubber eraser to remove corrosion and contamination from the battery charger contacts.

C. Use low-pressure compressed air to remove eraser particles from the battery charger.

WARNING: USE EYE PROTECTION TO AVOID INJURY. AIR PRESSURE SHOULD NOT EXCEED 40 PSI.

D. Use isopropyl alcohol and a cotton tip swab to remove residue.

4. External Cleaning

Use a cloth or paper towel and general purpose cleaner to wipe the external surfaces of the HHR. Use a dry cloth or paper towel to remove excess cleaner.

NOTE: Use a brush and general cleaner to remove any unwanted material near the temperature sensor, found on the bottom of the HHR.

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CHECK

TASK 32-49-09-200-801

1. General

This section contains instructions to do an inspection of the Handheld Reader (HHR).

2. Procedure

A. Visually examine the temperature sensor, found on the bottom of the HHR, to be sure there is no unwanted material. Refer to CLEANING.

B. Visually examine the HHR for any signs of external damage. Make sure that there are no defects that would allow moisture to enter the housing.

C. Cosmetic damage or external wear is acceptable. If there is any damage that affects operation, the HHR must be replaced.

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REPAIR

TASK 32-49-09-300-801

1. Handheld Reader

The only possible repair of the HHR is to replace the battery.

NOTE: If the battery is not charged, refer to DISASSEMBLY and ASSEMBLY to remove and replace the battery. Refer to DESCRIPTION AND OPERATION, paragraph 3.A, to recharge the battery.

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ASSEMBLY

TASK 32-49-09-400-801

1. General

A. HHR Battery Installation

WARNING: IF THE BATTERY CASE IS CRACKED, DO NOT INSTALL THE BATTERY IN THE HHR. AN EXPOSED BATTERY CAN BURN AND CAUSE A FIRE OR EXPLODE.

WARNING: LITHIUM-ION BATTERIES CONTAIN TOXINS. CALL +1-800-822-8837 FOR INFORMATION TO RECYCLE OR DISCARD A LITHIUM-ION BATTERY.

NOTE: If necessary, refer to DESCRIPTION AND OPERATION, paragraph 3.A, to recharge the battery.

The only assembly procedure applicable to the HHR is the installation of the battery pack. Do the steps below to put the battery in the HHR.

(1) Put the battery in the display end of the HHR.

(2) Push the battery into the HHR until it locks.

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Figure 7001
HHR Battery Installation

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SPECIAL TOOLS, FIXTURES AND EQUIPMENT

TASK 32-49-09-940-801

1. General

Tools, fixtures and equipment necessary to do the procedures in this manual are given in Table 9001. This table includes both special and standard equipment. Equivalent alternatives can be used for the items given below.

TASK 32-49-09-991-808

Table 9001
Special Tools, Fixtures and Equipment

NOMENCLATURE	PART NUMBER/ SPECIFICATION	SOURCE)	USAGE
Local Barometric Standard	± 0.04 psi (minimum)	Commercial	Testing

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ILLUSTRATED PARTS LIST

1. General

The Illustrated Parts List (IPL) gives figures and tables for the parts that are in the equipment. The IPL figures show each major assembly of the equipment in a disassembled form. The tables show the part numbers of the parts that are on the IPL figures.

A. Figure Item Number Column

Each part in the parts table is given its own item number in the figure-item column. The item number can be used to find the part on the IPL figure. A dash (–) before the item number identifies parts that are not shown on the figure.

B. Part Number Column

The part number column gives part numbers for ELDEC parts, vendor parts, commercial standard parts, or military standard parts. If ELDEC modifies or selects a vendor part or standard part, the nomenclature column gives the related ELDEC specification number (for example, 83-008501-01).

C. Airline Part Number Column

The airline part number column is used by the operator to give local part numbers.

D. Nomenclature Column

(1) The nomenclature column uses the indenture system (. . .) to show the relationships of the higher and lower assemblies. A repairable assembly has its detail parts given in the next indenture below and to the right. The next higher assembly of any detail part may be found in the indenture above and to the left.

(2) Parts that have a vendor code number (Vxxxxx) in the nomenclature column are available through that approved vendor. Parts that do not have a vendor code number in parentheses are either commercial standard parts, military standard parts, or ELDEC parts.

(3) Attaching parts immediately follow the part or assembly that they attach, and have the same indenture. They start with the words ATTACHING PARTS, and stop with the symbol ***.

(4) Electrostatic Discharge (ESD) identifies a part that can be damaged by an electrical charge that is generated by friction. Electrostatic Discharge Sensitive (ESDS) also identifies a part that can be damaged by an electrical charge that is generated by friction. Obey standard precautions when you touch, move, or do a preservation procedure on ESD or ESDS parts.

(5) Other words used in the Nomenclature column are defined below:

Optional (OPT): This part is optional to and interchangeable with other parts in the same item number variant group or other item number if designated.

Superseded by (SUPSD BY): The part is replaced by and is not interchangeable with the item number shown.

Supersedes (SUPSDS): The part replaces and is not interchangeable with the item number shown.

Replaced by (REPLD BY): The part is replaced by and interchangeable with the item number shown.

Replaces (REPLS): The part replaces and is interchangeable with the item number shown.

E. Effectivity Code Column

Within a figure, the letters that appear in the effectivity code column (EFFECT CODE) show parts that have special use. A part that has an effectivity code must be used in the next higher assembly that has the same effectivity code. The codes apply to a single figure only; the codes in one figure are not related to the codes in another figure. Where no code is given, the part is used on all configurations.

F. Units Per Assembly Column

The units per assembly column shows the quantity of a part that is used for the specific figure-item number. The letters RF are given for part numbers that are used only for identification in a table. The letters AR identify parts whose quantity may be different for similar assemblies.

TASK 32-49-09-980-801

2. Vendor Code, Name and Address

The vendor code, name and address gives the data necessary to order parts from the manufacturer.

CODE	NAME AND ADDRESS
V08748	Crane Aerospace & Electronics ELDEC Corporation PO Box 97027 Lynnwood, WA 98046-9727
V1ZGU2	SF Cable Inc. 29441 Kohoutek Way Union City, CA 94587-1237
V50DN4	Bosch Corporation DBA BC International 161 Fashion Ln. Ste. 100 Tustin, CA 92780-3325

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TASK 32-49-09-990-856

Figure 1
Handheld Reader Kit

FIG ITEM	PART NUMBER	AIRLINE PART NO.	NOMENCLATURE 1234567	EFFECT CODE	UNITS PER ASSY
TASK 32-49-09-950-801					
1–					
-1	KIT83-008-01		KIT, HANDHELD READER, 120 VAC	A	RF
-1A	KIT83-008-01E		KIT, HANDHELD READER, 240 VAC	B	RF
-5	83-008101-01		.PACKAGE, HANDHELD READER		1
10	83-008001-01		..READER, TPS HANDHELD		1
-15	83-008801-01		...FIRMWARE, VERSION 1 (ORDER NHA)		1
-20	83-008501-01		...COVER, USB		1
25	BAT411		..BATTERY, 12 VDC (V50DN4)		1
-25A	D70745		..BATTERY, 12 VDC (V50DN4) (OPT TO ITEM 25)		1
-30	TID60000532		..CABLE, USB, TYPE MINI B PLUG TO TYPE A PLUG, 6' (V1ZDU2) (CORRECT PN IS TID 60000532)		1
-35	83-008821-01		..CD, PC eHHR-SW		1
40	BC430		.BATTERY CHARGER, 12 VDC, 120 VAC (V50DN4)	A	1
-40A	AL1130CV		.BATTERY CHARGER, 12 VDC, 240 VAC (V50DN4) (CORRECT PN IS AL-1130-CV)	B	1

- Item not illustrated

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STORAGE

TASK 32-49-09-550-801

1. General

The HHR kit has some components with different storage methods. Use the steps below to prevent damage to the contents of the HHR kit.

CAUTION: DO NOT ALLOW LIQUIDS TO GET INTO THE TPS HANDHELD READER, THE BATTERY OR THE BATTERY CHARGER. MOISTURE CAN CAUSE CORROSION TO THE BATTERY CONTACTS AND CAN CAUSE DAMAGE TO ELECTRONIC CIRCUITRY.

A. Remove the Battery

Remove the battery (IPL Figure 1, item 25) from the TPS Handheld Reader (IPL Figure 1, item 10).

B. Store the TPS Handheld Reader

Put the TPS Handheld Reader in a polyethylene bag and seal it.

C. Store the Battery

Put the battery in a polyethylene bag and seal it.

WARNING: IF EXPOSED TO A MOISTURE, FLAME OR HIGH TEMPERATURE, A LITHIUM-ION BATTERY CAN BURN AND CAUSE A FIRE OR EXPLODE.

WARNING: DO NOT STORE THE BATTERY IN OR NEAR CONDUCTIVE MATERIALS, FOR EXAMPLE A STATIC SHIELDED BAG OR METAL TOOL BOX. IF THE BATTERY TERMINALS ARE SHORTED, THE BATTERY CAN BURN AND CAUSE A FIRE OR EXPLODE.

WARNING: IF THE BATTERY CASE IS CRACKED, DISCARD IT. AN EXPOSED BATTERY CAN BURN AND CAUSE A FIRE OR EXPLODE.

WARNING: LITHIUM-ION BATTERIES CONTAIN TOXINS. THE CORRECT METHOD MUST BE USED TO DISCARD THE BATTERY. CALL +1-800-822-8837 FOR INFORMATION TO RECYCLE OR DISCARD A LITHIUM-ION BATTERY.

CAUTION: MAKE SURE THE BATTERY IS STORED AT A TEMPERATURE BETWEEN -4 AND +113 °F (-20 AND +45 °C). IF A BATTERY IS STORED ABOVE OR BELOW THESE TEMPERATURES, IT CAN BE PERMANENTLY DAMAGED.

D. Store the Battery Charger

Put the battery charger in a polyethylene bag and seal it.

E. Store the HHR Kit

Do the steps in paragraphs B, C and D. Store the TPS Handheld Reader, battery and battery charger with the other kit components. Use a container or bag that will prevent moisture damage.

2. Preparation for Storage

Remove the battery from the HHR if it will be in storage for a long period of time.

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